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Research Article

Formulation and Evaluation of Anti-fungal Cream Using Senna-Tora and Origanum Vulgare

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ABSTRACT

The goal of administering herbal medicine is to effectively manage human illness. According to the WHO, herbal medicine currently provides primary care for 80% of the world's population. To get rid of fungi and stop them from growing, antifungal cream is a type of cream. In addition to creating a cream that doesn't exhibit any undesirable reactions or side effects, this study attempts to investigate the safety and effectiveness of prepared antifungal cream. The most common fungal infections that affect our skin, hair, and nails are treated with the herbal antifungal cream. Jockey itch, ringworm, and athlete's foot are examples of fungal skin infections that are treated with herbal antifungal creams. When it comes to reducing fungal infections, this herbal antifungal cream is safe, natural, and effective. This extract can be evaporated in a water bath to make it semi-solid. Then, use the semi-solid extract to make a cream base formulation

INTRODUCTION

Infections caused by fungi are prevalent in nature. Fungal infections in humans happen when a fungus invades a body part that the immune system finds challenging to combat. There are two types of fungi: beneficial and harmful. The former infiltrate the body, are challenging to eradicate, can re-infect the patient while they are recovering, and can endure in the environment. Human fungal infections are common and, with prompt and appropriate treatment, are typically not life-

threatening. Anyone on antibiotics or with a compromised immune system may be at higher risk of contracting a fungal infection. Diabetes and cancer treatment may also increase a person's susceptibility to fungal infections (Johnson, 2018). Numerous studies that demonstrate plants as a possible source of bioactive secondary metabolites have been added to the literature (Shrestha et al., 2016; Dahiya et al., 2019; 2017; Dahiya and Singh, 2017a; 2017b; Viana et al., 2017; Senthil Kumar et al., 2017).

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Herbal Cosmetics:

Because they frequently don't contain synthetic chemicals, herbal cosmetics are well-liked by people looking for kinder substitutes because they use natural ingredients made from plants, herbs, and minerals to nourish and improve the skin and hair. Compared to their synthetic counterparts, these products are thought to be safer and less likely to cause negative reactions or skin irritations. They are also frequently environmentally friendly because they are made from renewable resources and may biodegrade. It's important to remember that while herbal cosmetics can have advantages, individual reactions may differ, so it's important to choose products carefully and see a dermatologist if you have specific skin concerns.

Cream:

Creams are semi-solid emulsions that are applied to the skin to nourish, moisturize, and protect it. They are made up of water, oil, and additional substances such as thickeners, preservatives, and emulsifiers. Various skin types and requirements, including medicated creams for particular skin conditions, antiaging creams, and moisturizing creams. In addition to delivering active ingredients deep into the skin layers for specific benefits, they hydrate the skin by halting water loss. Because of their simplicity of use and efficiency in improving skin, creams are a popular option for daily skincare routines.

Anti-Fungal Cream

Topical drugs called antifungal creams are used to treat fungal skin infections like jockitch, ringworm, and athlete's foot. The active ingredients in these creams, such as terbinafine, miconazole, clotrimazole, or ketoconazole, function by preventing the growth of fungi and curing the infection. When prescribed by a medical

practitioner, antifungal creams are applied topically to the afflicted area and are typically used for a predetermined amount of time. When taken regularly and as directed, they can successfully eradicate fungal infections and relieve symptoms like itching, redness, and irritation. For safe and efficient use, it is imperative to adhere to the directions on the packaging or those supplied by a healthcare professional.

Physiology of Skin:

The body's first line of the defense against outside threats is the skin, an extremely vital and complex organ. The epidermis, dermis, and hypodermis are its three main layers, and each has unique characteristics and purposes. The dermis, with its abundant network of collagen fibers, blood vessels, and hair follicles, adds strength, elasticity, and nourishment, while the epidermis offers a robust protective layer. The body is insulated and cushioned by the hypodermis, the deepest layer, which also stores energy and shields the organs underneath. Together, these layers enable the skin to perform its vital functions, which include immunity, excretion, temperature control, protection, and sensation. Protection is one of the skin's most vital roles, which it fulfills by protecting the body from infections, physical harm, and UV rays. By using specialized nerve endings to sense touch, pressure, pain, and temperature, the skin also plays a significant part in sensory perception. Another important function is thermoregulation, in which the skin uses mechanisms like sweating and vasodilation to help keep the body temperature steady. The skin also produces vitamin D, helps the body eliminate waste through sweat glands, and supports the immune system by producing cells that identify and fight off infections. The production of collagen and elastin by the skin decreases with age, resulting in decreased elasticity and wrinkle development. Additionally, as we age, our skin



gets thinner and drier, which makes it more vulnerable to damage and takes longer to heal. The skin's capacity for regeneration is unaffected by these alterations, enabling it to recover from wounds and restore its protective layer. However,

a number of skin disorders, including psoriasis, eczema, and acne, can interfere with the skin's natural processes, impacting both the skin's health and appearance.

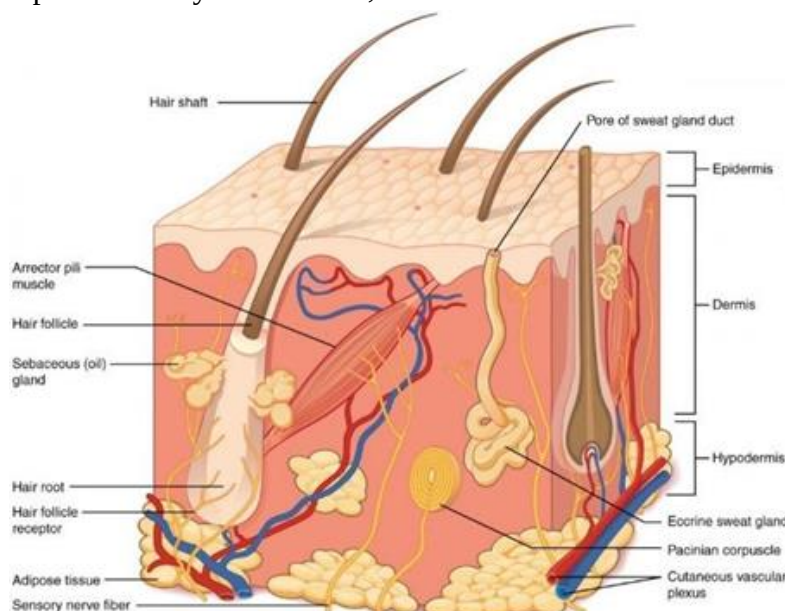


Figure 1

3. Aim And Objectives:

The goal of the current study is to create, develop, and assess a herbal antifungal cream that uses variety of illnesses. Thus, the goal of this study is to create an antifungal cream that is natural, affordable, and effective by utilizing their inherent medicinal qualities.

Specifically, the objectives are to:

- Extract the active ingredients from *Origanum vulgare* and *Senna Tora*.
- Mix these extracts to create a cream base that can be applied topically.
- Conduct in vitro (laboratory-based) and in vivo (living organism) studies to assess the developed cream's fungal efficacy.
- Examine how the herbal cream affects bacteria in comparison to traditional antifungal therapies.

- Use dermatological testing to evaluate the cream for any possible adverse effects or skin irritation.

The purpose of this study is to offer scientific backing for the use of these conventional herbal treatments for fungal infections, which could lead to the creation of a herbal antifungal product that is commercially feasible.

Drug Profile:

Origanum vulgare:

- Family: Lamiaceae.
- Genus: herbaceous perennial
- Common Name: Greek organo, mint
- Active Components: phenolic compounds, flavonoids, and essential oils.



Figure 2

2. Senna Tora:

- Family: Legumes
- Genus: Senna
- Common Name: Takla, Tarwad, Chakra marda



Figure 3

3. Santalum album L:

- Family: Santalaceae
- Genus: Santalum
- Species: Santalum album L.
- Common Name: sandalwood
- Active Components: santalol, wood and oil.



Figure 4

4. Aloe vera

- Family: Asphodelaceae (Liliaceae)
- Genus: Aloe
- Species: Aloe barbadensis 'Miller'.
- Common Name: Indian aloe, medicinal aloe, burn aloe, and true aloe.
- Active Components: anthraquinones, polysaccharides, vitamins, and enzymes.



Figure 5

5. Curcuma longa:

- Family: Zingiberaceae.
- Genus: Curcuma; L. (1753), nom. cons
- Common Name: turmeric



Figure 6

a) *Origanum vulgare*:

Oregano is a type of flowering plant that belongs to the Lamiaceae family of mints. Although it originated in the Mediterranean, it has since spread throughout the temperate Northern Hemisphere. The woody perennial oregano plant can reach a height of 90 cm and has opposite leaves that are 1-4 cm long. Rosmarinic acid, linalool, thymol, carvacrol, tannins, flavonoids, triterpenes, and phenol carvacrol are the bioactive components of the extract of *O. vulgare* leaves. Iron, vitamins, calcium, copper, niacin, magnesium, and thiamine are also found in oregano. A common herb in the Mediterranean diet, oregano (*Origanum vulgare*) has been demonstrated to have a number of bioactive qualities, such as analgesic, anti-oxidant, anti-microbial, and anti-fungal effects. has demonstrated strong antifungal qualities, mainly from the compounds carvacrol and thymol found in its essential oil, which could help treat a variety of fungal infections, especially those brought on by *Candida albicans*.

b) *Senna Tora*:

Indeed, fungal infections have been treated with *Senna tora* (*Cassia tora*). Other ailments like bronchitis, constipation, and skin disorders are also treated with it. The plant has antifungal

activity due to the presence of chrysophanic acid-9-anthrone, which prevents the growth of *Trichophyton rubrum*, *T. mentagrophytes*, and other organisms.

c) *Santalum album* L

The small tropical tree *Santalum album* is the traditional source of sandalwood oil. It is indigenous to Western Australia, the Philippines, and Indonesia. It is frequently referred to as Indian sandalwood, white sandalwood, or true sandalwood. Native to India, white sandalwood (*Santalum album*) is an evergreen tree. Traditional Ayurvedic medicine uses its wood and wood oil. Chemicals found in white sandalwood may help stop bacteria and fungus from growing. In terms of cytotoxic and antifungal properties, the most potent essential oils were those found in sandalwood species (*Santalum album*, *S. austrocaledonicum*, and *S. paniculatum*), which are abundant in santalols; cassia (*Cinnamomum cassia*); and cinnamon (*C.*

d) *Aloe vera*

Aloe vera belongs to the genus *Aloe* and is a succulent plant. It is found all over the world and is regarded as an invasive species in many places. Originating in the Arabian Peninsula, this perennial evergreen grows wild in arid, tropical, and semi-tropical regions worldwide. *Aloe* is a plant that resembles a cactus and grows best in hot, dry climates. It is grown all over the world in subtropical climates, such as the southern border regions of Arizona, California, New Mexico, and Texas. *Aloe* has long been used to treat skin disorders and was believed to help with wound healing and baldness. The medicinal plant *aloe vera* has long been used to strengthen the integrity of the skin. *Aloe vera* is well-known for its antifungal, antibacterial, antiviral, antiseptic, skin-protective, and wound-healing qualities. Because

of its antifungal qualities, aloe vera can be used to treat fungal infections such as dandruff, jock itch, and athlete's foot. Additionally, it can be used to treat fruit fungal growth.

e) **Curcuma longa:**

Curcuma longa, also known as turmeric, is a flowering plant that belongs to the Zingiberaceae family. Native to Southeast Asia and the Indian subcontinent, this perennial, rhizomatous herbaceous plant needs high annual rainfall and temperatures between 20 and 30 °C to flourish. Indian cooking has long used curcuma longa, also referred to as tumeric, as a spice. Numerous biological activities, such as the plant's anticancer, antimicrobial, antiinflammatory, and free radical scavenging properties, provide a rationale for its long-standing use in food. Turmeric, or Curcuma longa, is used in creams to treat fungus-related infections like ringworm and tinea. The plant Curcuma longa contains a polyphenol compound called curcumin, which has antifungal qualities.

5. Experimental Studies:

a) **METHODOLOGY:**

Material Requirement:

- Senna Tora
- Origanum vulgare
- Santalum album L
- aloe vera
- Curcuma longa
- Beeswax
- Liquid Paraffin
- Borax
- Methyl paraben

Preparation of Extract:

- The cold maceration method was used for the extraction. Initially, the powdered plant material,
- Origanum vulgare and Senna Tora, was macerated for 24 hours in a 70:30 alcohol and water mixture in a round-bottom flask (RBF), shaking occasionally.
- The solvents were then filtered after the 24-hour period, and the powdered Origanum vulgare was collected.

Preparation Of Herbal Cream:

- All ingredients were carefully weighed.
- In a borosilicate glass beaker, heat liquid paraffin and beeswax to 75 °C and keep it there. (Oil phase) . In a separate beaker, dissolve borax and methylparaben in distilled water, then heat this beaker to 75 °C to dissolve the borax and methylparaben and to obtain a clear solution. (Aqueous phase).
- Then, add a measured quantity of Origanum vulgare, Santalum album L., and stir vigorously until it forms a smooth cream.
- **Formulation Table for preparation of cream:**

Table No 1

Sr.no	Ingredients	Quantity	Role
1	Senna Tora	5 gm	Antifungal (API)
2	Origanum vulgare	5 gm	Antifungal (API)
3	Santalum album L	1 gm	Perfume
4	Aloe vera	1 gm	Antifungal (API)
5	Curcuma longa	2 gm	Antifungal (API)



6	Beeswax	2 gm	Emulsifying Agent
7	Borax	2 gm	Buffering Agent
8	Methylparaben	2 gm	Preservative

Other excipients:

Beeswax:

The natural material that honeybees secrete, beeswax, is essential to the building and upkeep of the hive. Esters, fatty acids, and hydrocarbons make up the majority of its composition, which makes it a complex mixture with a range of uses. Because of its special set of qualities, beeswax is useful in many different industries. Along with different alcohols like triacontanol and melissyl alcohol, its primary constituents are palmitic, oleic, and linoleic acids. These substances give beeswax its distinct consistency and smell.

Borax:

Sodium borate, another name for borax, is a compound that can be used in a variety of settings, including homes and businesses. The formula for it is $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$. The main sources of borax are natural deposits in nations like Chile, the Usa Turkey. Borax's characteristics include being a white, odorless powder that dissolves readily in water. Its capacity to function as a buffering agent, assisting in the stabilization of pH levels in

solutions, is among its most noteworthy qualities. Because of this characteristic, it is useful in cosmetics, cleaning products, and even as a food additive.

Methyl Paraben

Because it can prevent microbial growth and prolong product shelf life, methyl paraben is a frequently used preservative in food, pharmaceutical, and cosmetic products. In terms of chemistry, it is a member of the paraben family, which includes para-hydroxybenzoic acid esters. Usually, methanol and para-hydroxybenzoic acid are used to create methyl paraben. Its antimicrobial qualities improve product stability and safety by effectively combating a variety of bacteria and fungi. Although there has been some debate regarding its safety, especially regarding its potential to interfere with endocrine function because it can mimic estrogen, scientific consensus indicates that it poses little risk to human health at normal exposure levels.

Evaluation Of the Cream

To evaluate the quality of the prepared formulation, several quality control tests were conducted, including visual evaluation and physiochemical and conditioning performance tests.

• Organoleptic Properties

Table No.2

Parameters	Senna Tora	Origanum vulgare
Texture	The Senna tora plant is a small, slender shrub that can grow to be 0.5–2 meters tall	soft, fuzzy texture. The leaves are flat, oval-shaped, and can be hairy or hairless.
Smell	foul or disagreeable	strong, warm, and pungent smell
Taste	bitter, macilaginuous taste	spicy and pungent flavor, similar to marjoram but not as sweet
Tongue sensation	Rough	almost minty aroma



• Screening Of Cream Formulation Phytochemically

Table No.3

Phytoconstituent	Senna Tora	Origanum vulgare
Carbohydrate	+	+

Protein	+	+
Fats	+	+
Alkaloid	+	+

• Procedure of Phytochemical Test:

Test for Carbohydrate:

Table No. 4

Test	Observation		Inference
	Senna Tora	Origanum vulgare	
Molisch test: Mix 2ml of carbohydrate sample with 5 drop of molisch reagent in a test tube about 2ml of conc H ₂ SO ₄ so has to form bottom layer	Purple or violet ring forms at interference between the acid and aqueous phase	Purple or violet ring forms at interference between the acid and aqueous phase	Carbohydrate Present
Solubility: Compound + water	Insoluble	Insoluble	Polysaccharide Present
Iodine test: To about 2ml suspension or solution of polysaccharides add 1-2 drop of N/50 Solution.	Solution remains yellow brown	Solution remains yellow brown	No Starch Present

Test for protein:

Solubility Test:

To test the protein's solubility, separately add 0.5 grams of casein to 2 milliliters of 0.1 N NaOH, 2 milliliters of 0.1 N HCL, and 2 milliliters of distilled water. The casein completely dissolves in 0.1N NaOH, so remove the tubes after soaking them in water for ten minutes.

Preparation of sample solution:

Break Down 100 ml of 0.1N NaOH with 1g of casein added to make a solution

c) Biuret Test: Mix with 2 ml of protein solution, add 2 ml of 10% NaOH solution, and add 3–4 drops of 1% copper sulfate solution. Purple is created

when a peptide bond is present and the solution being analyzed is a protein.

Test for Alkaloids:

Each extract (0.5 g) was shaken in a steam bath with 5 mL of 1% HCL. After filtering the resulting solution, one milliliter of the filtrate was mixed with a few drops of Mayer's reagent. The turbidity of the filtrate following the addition of Mayer's reagent indicated the presence of alkaloids in the extract.

Test for Glycosides:

After adding a milliliter of pyridine and a few drops of sodium nitroprusside solution, the hydrolysate was made alkaline by adding sodium



hydroxide solution. Glycosides are indicated by a pink to red appearance.

7. Extraction Of Herbal Drug

Maceration is a compound extraction technique that has been used for ages. To extract the soluble components of a solid, the basic idea is to soak it in a liquid. This is usually accomplished by drying and grinding the sample to increase the surface area between it and the liquid solvent. An alternative technique is to continuously extract the desired components of a mixture using a rotavapor. The rotary evaporator uses a spinning flask that is submerged under vacuum and in a heated water bath. The rotation creates a thin layer

of the mixture, which evaporates when heated. The vacuum has the opposite effect from my pressure cooker. Instead of raising the boiling point due to increased pressure, the vacuum lowers it. The solvent can therefore evaporate at lower temperatures. Modern rotary evaporators can perform even more complex operations, like continuous extractions. The vaporized solvent condenses and is collected in a separate container during a continuous extraction process. The condensed solvent is then used in the subsequent extraction cycle. This method allows for a continuous and efficient process because the solvent can be reused. The low temperatures prevent the deterioration of heat-sensitive materials.



**Maceration Of Senna
Tora**



**Maceration of Origanum
Vulgareae**

8. Beneficial Properties of “Powder of The Drugs”

a) An extractive soluble in alcohol:

100 milliliters of 90% alcohol were added to a Stoppard conical flask containing five grams of precisely weighed powdered medication. After being continuously shaken for six hours in an electrical shaker, the mixture was allowed to macerate overnight. The weight and percentage of the extractive were then calculated after the filter was carefully evaporated until it was dry.

Alcohol-Soluble Extractive: $100 \times \frac{\text{extractive weight}}{\text{drug weight}}$

b) Extractive Soluble in Water:

One hundred milliliters of chloroform water were added to a Stoppard conical flask that held five grams of precisely weighed powdered medication. After six hours of constant shaking in an electrical shaker, the flask was left overnight to macerate. After that, the extractive was meticulously filtered and dried completely by evaporation. After

determining the extractive's weight, the percentage was calculated using the formula

$$\text{Weight of Ash} / \text{Weight of Drug} \times 100 = \text{Total Ash}$$

Weight of Extractive / Weight of Drug X 100 = Water-Soluble Extractive.

c) Total Ash:

A China dish was used to weigh three grams of the drug, burn it at a temperature of no more than 450 degrees Celsius until the carbon was gone, let it cool, and then weigh it again until it stayed the same for three readings. The air-dried drug was used to calculate the percentage of ash.

d) Acid Insoluble Ash:

The full amount of ash was obtained after boiling it for five minutes with 25 milliliters of diluted hydrochloric acid. After that, the insoluble substance was collected in a Gooch crucible, cleaned with hot water, and burned until its weight remained constant. The percentage of acidinsoluble ash was calculated in relation to the drug that had been allowed to air dry.

Table No.5

Test	Result		Inference
	Senna Tora	Origanum vulgare	
Total Ash Content	Moderate	Moderate	Both has moderate ash content
Acid Insoluble Ash Content	Low Acid Insoluble	Low Acid Insoluble	Both has low acid insolubility
Alcohol Soluble Content	Moderate alcohol-soluble content.	Moderate to high alcohol-soluble content.	Senna Tora has moderate while Origanum vulgare has moderate to high alcohol solubility
Water Soluble Content	Moderate water-soluble content.	Moderate water-soluble content.	Both has moderate water solubility

9. Therapeutic Use:

1. Senna Tora:

Anti-Fungal:

The growth of phytopathogenic fungi such as *Alternaria helianthii*, *Pythium aphanidermatum*, *Fusarium oxysporum*, and *Aspergillus niger* has been inhibited by crude extracts of Senna tora leaves. Traditional medicine uses Senna tora leaves as a laxative.

Other Potential Use:

Senna tora has been used traditionally to treat liver diseases, eczema, diabetes complications, and vision problems.

Skin Health:

- Skin conditions: Senna tora has been used to treat psoriasis, ringworm, leprosy, and itching.
- Rashes, scabies, and eczema: Senna tora leaves are useful for treating rashes, eczema, and itching.
- Senna tora has been used to treat snakebite injuries.



- Arthritis: A balm for arthritis has been made from senna tora leaves.

2. **Origanum vulgare: Anti-Fungal:**

- Carvacrol and thymol, found in Origanum vulgare, prevent Candida from growing.
- Its antifungal qualities are comparable to those of amphotericin B and nystatin.
- In one study, mice that received 1.0 µl of oregano essential oil orally daily for 30 days were cured of systemic candidiasis.

Other Consideration:

- In vitro research has been done on oregano essential oil's antifungal properties.
- To guarantee its safe application in food preservation, more in vivo research is required. Essential oil combinations may have a synergistic effect that reduces adverse effects.

Skin Health:

- Antimicrobial: Origanum vulgare has antimicrobial properties that may help with bacterial skin infections.
- Anti-inflammatory: Origanum vulgare may help reduce inflammation and tissue remodeling.
- Antioxidant: Origanum vulgare has antioxidant properties that may help reduce skin aging.
- Wound healing: Origanum vulgare may help with wound healing.

10. **RESULT:**

Evaluation studies of prepared formulations:

The prepared three formulations were evaluated by observing the appearance and consistency. Further formulations were evaluated by conducting pH

measurement, Spreadability, viscosity, washability and foamability

Physical Appearance:

The formulated wound healing cream was visually inspected for their colour, odour and consistency.

Formulation	Colour	Odour	Consistency
F1	Yellow	Pleasant	Thick
F2	Yellow	Pleasant	Thick
F3	Yellow	Pleasant	Thick

Determination of pH:

The ph. of prepared formulation was determined using ph. paper and the ph value are shown below

Formulation	pH
F1	6.4
F2	6.2
F3	6.8

Determination of Spreadability:

Spreadability plays an important role in patient compliance and ensures uniform application of the cream. Good Spreadability can ensure the distribution of the cream when applied to the skin.

Formulation	Spredability (gm.cm/sec)
F1	4.2
F2	4.8
F3	4.9

Antimicrobial Studies:

Formulation	Zone of Inhibition
Standard	13
F3	12.8

11. **CONCLUSION:**

Senna tora and Origanum vulgarea work very well together to treat skin infections caused by a combination of bacteria and fungi. Research backs up its effectiveness in treating conditions like



secondary infections, dermatophytosis, and paronychia.

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